

## **Cincinnati Maker Space**

### ***Emission Calculations for Woodworking Operations***

**Facility Name:** Cincinnati Maker Space  
**County:** Hamilton  
**Facility Type:** Various wood product manufacturing/hobby shop  
**Emission Sources:** Sawdust Collection and Handling System

Cincinnati Maker Space (CMS) is a small non-profit organization/member funded work space that allows its members to access larger and better tools and assembly space than they might not otherwise have access to in a home garage or workshop. CMS has tools for metal working\*, wood working, electronics, laser cutters and 3D printers. Members utilize the space to make their own projects so a wide range of products could be produced. Members may occasionally paint or varnish a product as well. \*\*

A variety of wood working tools are attached via 6" ducting to a Tempest CX Cyclone, which separates out the dust/sawdust, and vents outside. Dust/sawdust from the cyclone empties into one 16-gallon container located inside and placed in the trash. The cyclone has a flow rate of 1350 CFM.

Grain loading was obtained from the California Air Resource Board study; Fine Particulate Emissions from Stationary and Miscellaneous Sources in the South Coast Air Basin, February 1979. The study indicates a 0.003 gr/scf factor for non-sanding operations and a 0.0168 gr/scf for sanding operations. For the purpose of these calculations the more conservative sanding emission factor of 0.0168 gr/scf was used.

Emission calculations were performed to determine the particulate emissions from the sawdust handling system.

#### **Shop Operating Hours**

Vary based on member use but approximately 4-5 times a week for 2-3 hours.

### **Emission Calculations**

#### ***Sawdust Handling System***

#### **Emission Calculations**

Basis for Calculations: Max capacity of the system as limited by the CFM  
Emission factor for sanding: 0.0168 gr/scf (CARB 2/79)  
PM/PM10 ratio: 58% (CARB 2/79)  
Max Operations: 24hrs/day 365days/yr

$$\frac{E = Q \times EF \times T \times 60 \text{ min/hr}}{7,000 \text{ grains/lb.}}$$

Where:

E=Emission rate in lb./day

Q=Flow rate (scfm)

EF=emission factor (0.0168 gr/scf)

T=hours of operation

### **Actual Emissions**

#### **Cyclone**

$$\frac{1350 \text{ scfm} \times 0.0168 \text{ gr/scf} \times 3.0 \text{ hr} \times 60 \text{ min/hr}}{7,000 \text{ gr/lb.}} = \mathbf{0.58 \text{ lbs. PM/day}}$$

$$\text{PM}_{10} = 0.58 \text{ lbs. PM/day} \times .58 = \mathbf{0.34 \text{ lbs. PM}_{10}/\text{day}}$$

$$\text{PM}_{2.5} = 0.58 \text{ lbs. PM/day} - 0.34 \text{ lbs. PM}_{10}/\text{day} = \mathbf{0.24 \text{ lbs. PM}_{2.5}/\text{day}}$$

### **Maximum Emissions**

#### **Cyclone**

$$\frac{1350 \text{ scfm} \times 0.0168 \text{ gr/scf} \times 24 \text{ hr} \times 60 \text{ min/hr}}{7,000 \text{ gr/lb.}} = \mathbf{4.67 \text{ lbs. PM/day}}$$

$$\text{PM}_{10} = 4.67 \text{ lbs. PM/day} \times .58 = \mathbf{2.71 \text{ lbs. PM}_{10}/\text{day}}$$

$$\text{PM}_{2.5} = 4.67 \text{ lbs. PM/day} - 2.71 \text{ lbs. PM}_{10}/\text{day} = \mathbf{1.96 \text{ lbs. PM}_{2.5}/\text{day}}$$

Based on the above calculations, CMS believes that the sawdust handling system represents a de minimis source (less than 10 lbs./day) and thus would not require an air pollution permit.

#### **\*Metal working**

CMS's metal working operations are rarely used and when in use all emissions are contained inside and are not vented outside. The cyclone is not operated when metal operations are in use. Since emissions do not escape building, no emissions calculations need to be conducted.

#### **\*\*Painting/varnish**

This is very seldom conducted but it may occur. Painting for a member's project may occur once every couple of months. There is no designated paint booth and no emissions are vented to the outside thus no emissions calculations need to be conducted.

*For emission demonstration purposes only of volatile organic compound (VOC):* a member could paint a quart a day at a VOC content of 4.9 lbs./gallon for 24 hours and still only have emissions of 9.8 lbs. VOC/day.

Painting occurs 3 hours a day (3 hour "shifts")

VOC content of paint or varnish = 4.9 lbs. VOC/gallon (just pulled from various colors of Sherwin Williams paints and primer)

Potential to emit (PTE) is 3 hours x 8 "shifts" = 24 hours

$\text{VOC} = 4.9 \text{ lbs./gallon} \times 0.25 \text{ gallons/day} = 1.22 \text{ lbs. VOC/day}$

$\text{PTE} = 1.22 \text{ lbs. VOC/day} \times 8 = \mathbf{9.8 \text{ lbs. VOC/day}}$